Power Markets and Risk Management

Contract #: 100-98-001 **Project #:** 8
Contractor: Electric Power Research Institute (EPRI)
Subcontractors: The Brattle Group: L.R. Christensen and Associates: The Northbridge Group: Bechtel Group, Inc.: Energoprojekt Consulting SA: Laurits R Christensen Associates, Inc.: M.S. Gerber & Associates: Marketing Decision Research, Inc.: Pattern Recognition Technologies: Strategic Decisions Group
Project Amount: $733,151
Match Amount: $7,702,872
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Status: Completed

Project Description:
The purpose of this project is to provide a means of understanding risk in the California energy market. Managing risk is a key to competitive electricity prices in California, but traditional analyses cannot accurately reflect the value of resources or risks in today's market. EPRI provides a unique and powerful framework—anchored in modern finance theory—for making decisions with less risk, avoiding huge losses and providing a more stable electricity price environment. EPRI's Electricity Book and other EPRI products extend this tool, and focus on other critical issues, such as forward price curves and ancillary markets. Classes, workshops, and interest groups help Commission staff use all of EPRI's risk management tools quickly and effectively.

This project supports the PIER Program objective of:

- Improving the energy cost/value of California's electricity by reducing the risk associated with large electricity transactions and providing a more stable California electricity market.

Proposed Outcomes:

1. Provide a comprehensive analysis tool to model the California electricity market and the risks associated with the market.
2. Provide tools to value the benefits and risks of energy market transactions.
3. Provide better Forward Curve estimates to improve energy users' decision making.
4. Provide better understanding of ancillary services.
5. Conduct a Tailored Collaboration entitled "Market Pricing and Market Structure Analysis" to identify critical market pricing and market structure issues within California's new competitive electricity market that influence new market entry and have a direct impact on system reliability.
6. Conduct a Tailored Collaboration entitled "Using Dynamic Simulation to Understand Power Plant Construction Cycles" to modify and enhance an existing simulation tool, which will allow the CEC to model the permitting and construction process and thereby obtain new information on the economics and dynamics of cycles in the building of electric generating capacity.

Actual Outcomes:

1. Analysis tool to model the electricity market.
   - Version 1.10 was released of EPRI's Energy Book System (formerly called Electricity Book), an integrated software package that provides the capability for calculating the value of generating units, and for measuring the risks of transactions. Separate modules are included for pricing and tracking wholesale energy transactions, valuing generation assets, designing retail products, and determining risk exposures.
   - Training and user groups meetings were held.
   - A report was published on describing commodity prices in the Energy Book System.
2. Tools to value benefits/risks of market transactions.
   - Version 1.10 was released of EPRI's Contract Evaluator software, which is designed to value and price wholesale energy transactions and to calculate exposures to wholesale energy markets.
   - Version 1.20 was released of Contract Evaluator, with enhancements that improve the accuracy and speed of the modeling of price movements for risk management and derivative contract pricing.
   - Version 1.10 was released of EPRI's Risk Manager software, which calculates overall portfolio risk based on exposures, market prices, and price volatilities.
   - Version 1.20 was released of Risk Manager, with enhancements similar to Contract Evaluator described above.
   - Two technical reports were published to assist planners in better measuring risks contained in assets and liabilities, and to understand and analyze the hedging strategies to lower those risks.
   - Five workshops were held on "Value and Risk Management."
   - A workshop was held on "Boom/Bust Cycles in the Power Industry: Power Generation Construction Cycles and Implications of Under- and Over-Building of Natural Gas-Fired Power Plants for Energy Markets and Plant Valuation." Presentations are compiled in a final report.
   - An EPRI Pricing Conference was held.
   - A newsletter was published on the latest EPRI software and tools for power markets and risk management.
3. Forward Curve estimates.
   - A sophisticated suite of tools, methods, and training was provided to assist planners in estimating forward curve price levels and volatilities in California power markets. Chief among these was a report entitled Forward Price Forecasting for Power Market Valuation.
   - Specific methods were provided for estimating process parameters—including natural gas prices and loads—which are key inputs to price forecasting.
   - Follow-up advancements were developed for the Forward Curve tools, including a calculation tool for identifying the marginal cost of power at nodes on the California grid, new algorithms for modeling load uncertainty scenarios, and a prototype model to facilitate application of the FastForward tool.
   - An assembled package was published entitled "Guide to Process Parameter Estimation Tool Kit," which includes a CD and a collection of four stochastic process parameter estimation spreadsheets.
   - More than half a dozen introductory and advanced training workshops and user group meetings were held.

4. Ancillary Services.
   • Measurement and certification tests were conducted at a host generator site. Findings provide insight into understanding methods for measurement and certification, as well as measured values of different ancillary services.
   • A report was produced on key concepts underlying price formation of ancillary services in deregulated markets.

   • A workshop was held on ancillary services pricing, market analysis, and operational issues.
   • Findings were published from a study entitled "The Gas-Electric Interface—A Regional Analysis," which characterized and interpreted announced capacity additions and determined the extent to which these additions are likely to lead to a net increase in gas consumption.
5. The tailored collaboration has not started, pending approval from the Commission.
6. The modeling tool was delivered and demonstrated to the CEC, and a written summary was presented.

Project Status:
The project has been completed.